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Justification of the method for evaluation of engine oil aging

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Abstract

© 2018, Institute of Advanced Scientific Research, Inc. All rights reserved. A laboratory research methodology has been developed to study the performance properties of engine oil to ensure long-term and reliable operation of automobile internal combustion engines (ICEs). Based on the results of the analysis of the engine oil operating conditions in internal combustion engines it has been established, that the greatest destructive factors are hydromechanical, thermodynamic, and thermochemical effects. The theoretical substantiation of the engine oil aging process in the laboratory conditions has been carried out. To study the dynamics of performance properties loss by engine oils and to predict the process of aging, a simulation model of the internal combustion engine lubrication system was created, which made it possible to determine the degree of the destructive effects that occur in engine oil. The values for the coefficient of aging process acceleration in engine oil are obtained, what made it possible to establish the oil life in operating conditions. In order to study the oil aging process in an internal combustion engine, an original design of a laboratory test bench was developed, what allows the physicochemical parameters of engine oil to determine in the accelerated test mode, to predict the oil life during engine operation, and also to simulate with sufficient precision the engine oil condition when automobile internal combustion engine is running, and to reproduce with certainty up to 95% the processes of changing the hydrocarbon composition of engine oil.

Keywords

Dielectric constant, Engine oil diagnostics, Engine oil performance properties, Internal combustion engine, Oil line pressure

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